

The Canadian Entomologist

LXVI

ORILLIA, FEBRUARY, 1934

No. 2

FOUR NEW SPECIES OF STONEFLIES FROM NORTH AMERICA (PLECOPTERA).

BY T. H. FRISON,

Illinois State Natural History Survey, Urbana, Illinois.

During the last seven years the writer has taken advantage of every opportunity to study the stoneflies, or Plecoptera, of Illinois. The desire to have this investigation rest upon an understanding of the bionomic and taxonomic relationships of this order in North America as a whole has led to the collection by myself of material in other geographical regions and the examination of specimens collected by others in various localities. In a group such as the stoneflies and so neglected by entomologists in general, it is not surprising that species new to science have been encountered during these studies. Briefly, then, the object of this paper is to describe four new species of stoneflies which because of the regions where they have been collected cannot well be squeezed into an account of the Illinois fauna but, nevertheless, are in need of a name.

The drawings have been made for me by Mr. Carl Mohr, Assistant Entomologist, Illinois State Natural History Survey.

The types of all the new species described in this paper are deposited in the collection of the Illinois State Natural History Survey.

***Pteronarcys shelfordi* n. sp..**

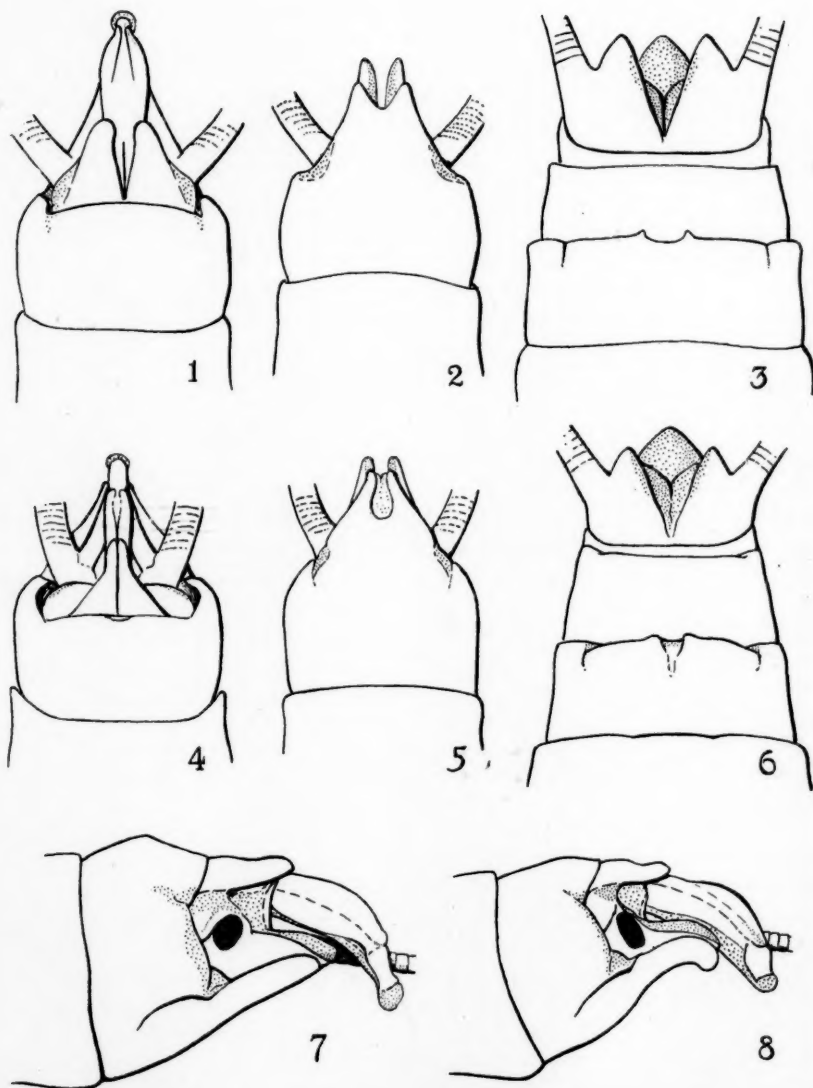
Male.—Body and appendages essentially dark brown in color, paler beneath and with obscure yellowish intersegmental markings. Veins of the fore wings bordered with fuscous shading, this marginal shading becoming a large spot near cord; hind wing with veins bordered with fuscous shading except veins of the anal lobe. Head and prothorax with raised rugosities.

Head with ocelli anterior to an imaginary line connecting front margins of compound eyes, lateral ocelli about as far apart as distance from inner margin of compound eye. Compound eyes strongly bulging from sides of head. Labium with the glossae extending approximately as far forward as paraglossae.

Prothorax slightly narrower than head, much wider than long, lateral margins straight, anterior and posterior margins bowed outwards, corners angular, posterior corners slightly pointed. A pale mid-dorsal line, widened at anterior and posterior margins. All thoracic sternites with nymphal gill remnants corresponding in position to those of nymph.

Abdomen with apical segment modified as follows: ninth ventral sternite prolonged rearward covering tenth sternite and ending in a notch (Fig. 2) the tips of which are not recurved downwards (Fig. 7) as in *nobilis* (Hagen) (Fig. 8); the lobes of tenth tergite not up-curved at apex (Figs. 1 and 7) as in *dorsata* (Say); supra-anal plate developed as sperm conveyor, unbranched and with a terminal sperm cup (Figs. 1 and 7). Nymphal gill remnants on first and second sternites.

Length to apex of wings, 43 mm.; expanse of wings, 75 mm.; body length, 32 mm.



Figs. 1-8. Dorsal and ventral views of apical abdominal segments of adults of *Pteronarcys shelfordii* Frison and *Pteronarcys nobilis* (Hagen). Figs. 1, 2 and 7 are of the male of *Pteronarcys shelfordii* and Fig. 3 is of the female of the same species. Figs. 4, 5 and 8 are of the male of *Pteronarcys nobilis* and Fig. 6 is of the female of the same species.

Female.—Similar to most morphological features of male. Eighth abdominal sternite with a shallow notch in middle of posterior margin and with a slight projection on each side of notch (Fig. 3). Length to apex of wings, 50 mm.; expanse of wings, 90 mm.; body length, 38 mm.

Holotype.—Male; Churchill, Manitoba, Canada, July 13, 1932, collected by Victor E. Shelford.

Allotype.—Female; same data as for holotype and associated with it.

This species has its closest relative in *Pteronarcys dorsata* (Say) from which it differs in the male by the shape of the apical abdominal segments and in the female by the shape of the eighth abdominal sternite. *Pteronarcys nobilis* (Hagen) is also closely related but differs from it as shown in Figures 4, 5, 6 and 8.

I take pleasure in naming this giant stonefly for its collector, Professor Victor E. Shelford of the University of Illinois.

***Alloperla chloris* n. sp.**

Male.—Body, legs and wings in general a pale or yellowish-green, whitish-yellow in preserved specimens; compound eyes and ocelli black; antennae concolorous with head at extreme base and then gradually shading to dark brown for most of its length.

Head somewhat wider than prothorax; median ocellus located about on a line with anterior margins of compound eyes, lateral ocelli located just anterior to line connecting posterior margins of compound eyes; distance from inner edge of compound eye to lateral ocellus about equal to distance between lateral ocelli. Antennae with about 30 segments.

Prothorax transversely oval, wider than long. Wings about concolorous with body, veins not contrasting with open cells; anal lobe of hind wing very small.

Tenth abdominal tergite cleft for reception of small somewhat triangular shaped supra-anal process (Figs. 9 and 10), without inward pointing hooks each side at base of cerci; eighth abdominal tergite without raised humps.

No traces or remnants of nymphal gills.

Length to apex of wings, 9 mm.; expanse of wings, 15 mm.; body length, 7 mm.

Female.—Similar in size and most morphological features to male. Eighth abdominal sternite but slightly rounded (Fig. 11).

Holotype.—Male; Caroline, New York, Lloyd-Cornell Wild Flower Preserve, on trees bordering small stream, August 16, 1928, collected by T. H. Frison.

Allotype.—Female; same data as for holotype.

Paratypes.—15 males and 51 females; same data as for holotype.

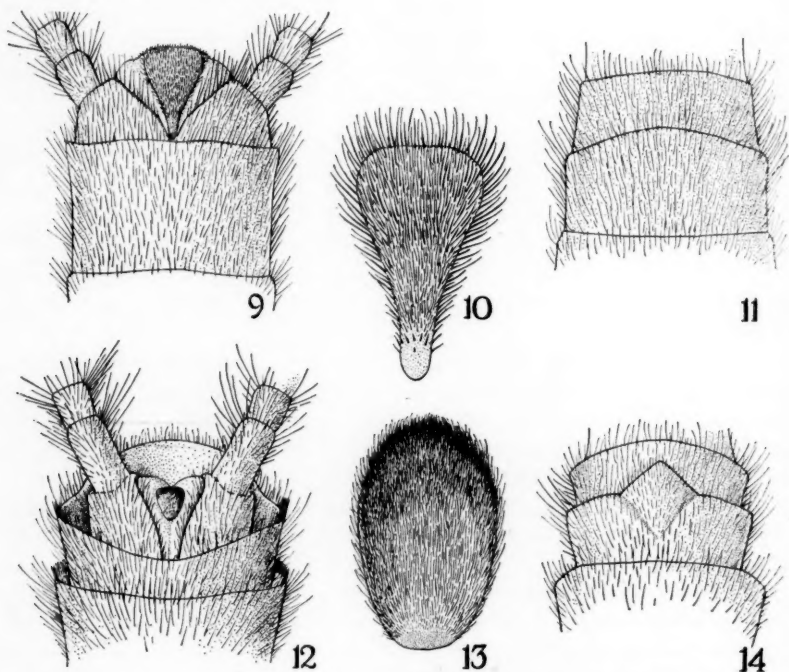
This species runs closest in the key to males of the genus *Alloperla* by Needham and Claassen (1925) to *serrata* Needham and Claassen. It differs, however, in the shape of the supra-anal process. The species apparently comes late in the seasonal succession of the species of *Alloperla*.

***Alloperla caudata* n. sp.**

Male.—Body, legs and wings in general a pale or yellowish-green, whitish-yellow in preserved specimens; compound eyes and ocelli black; antennae con-

colorous with head at extreme base and then gradually shading to light brown for most of its length.

Head somewhat wider than prothorax; median ocellus located about on a line with anterior margins of compound eyes, lateral ocelli located just anterior to line connecting posterior margins of compound eyes; distance from inner edge of compound eye to lateral ocellus about equal to distance between lateral ocelli. Antennae with about 32 segments.



Alloperla chloris Frison: Fig. 9, dorsal view of apical abdominal segments; fig. 10, supra-anal process of male; fig. 11, eighth and ninth ventral abdominal segments of female. *Alloperla caudata* Frison: Fig. 12, dorsal view of apical abdominal segments; fig. 13, supra-anal process of male; fig. 14, eighth and ninth ventral abdominal segments of female.

Prothorax transversely oval, wider than long. Wings about concolorous with body, veins not contrasting with open cells; anal lobe of hind wing very small.

Tenth abdominal tergite cleft for reception of very small somewhat globular-shaped supra-anal process (Figs. 12 and 13), without inward pointing hooks each side at base of cerci; eighth abdominal tergite without raised humps.

No traces or remnants of nymphal gills.

Length to apex of wings, 9 mm.; expanse of wings, 15 mm.; body length, 7 mm.

Female.—Similar in size and most morphological features to male. Eighth abdominal sternite with a triangular projection extending about half-way across ninth sternite on middle portion of posterior margin (Fig. 14).

Holotype.—Male; Adair County, Oklahoma, July 10, 1929, collected by Dr. R. D. Bird.

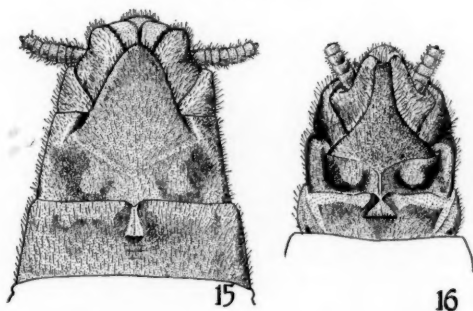
Allotype.—Female; same data as for holotype.

Paratypes.—3 males, same data as for holotype.

This species runs closest in the key to males of the genus *Alloperla* by Needham and Claassen (1925) to *serrata* Needham and Claassen. It differs, however, in the shape of the supra-anal process. It is also closely related to *Alloperla chloris* described in this paper but again is distinguishable on the basis of the shape of the supra-anal process.

***Strophopteryx cucullata* n. sp.**

Female.—Head, prothorax, sides of meso- and metathorax, and basal segments of legs dominantly yellow-brown; dorsum of meso- and metathorax, antennae, tarsi and spots on head and pronotum dark brown; wings rather uniformly stained with brown, except for narrow lighter band bordered by darker band near middle and perpendicular to long axis of fore wing; ground color of abdomen pale with a series of segmentally arranged darker transverse areas. Antennae long, composed of about 50 segments.



Figs. 15-16: Ventral views of the apical abdominal segments of *Strophopteryx cucullata* Frison and *Strophopteryx fasciata* (Burmeister) respectively.

Head about same width as pronotum; median ocellus anterior to an imaginary line drawn between front margin of compound eyes; lateral ocelli about on a line with the middle of compound eyes, and closer to edge of compound eyes than to each other; labium with the glossae extending approximately as far forward as paraglossae.

Prothorax somewhat wider than long and slightly widened posteriorly, angles rather distinct. Wings with venation normal for genus.

Abdomen with anal cerci short, composed of eight segments; genital opening on eighth sternite deeply inset and not covered by a subgenital plate; ninth sternite with a median broadly rounded triangular projection extending back nearly to end of abdomen (Fig. 15).

Without remnants or traces of nymphal gills. Lack of openings on coxae (scar of nymphal gills) certain indication along with other characters of membership in the genus *Strophopteryx* Frison.

Length to apex of wings, 14 mm.; expanse of wings, 24 mm.; body length, 12 mm.

Readily separated from *Strophopteryx fasciata* (Burmeister) (Fig. 16) by its broader subgenital plate.

Holotype.—Female; Latimer County, Oklahoma, boy scout camp, April 25, 1931, collected by Dr. R. D. Bird.

THE AMERICAN SPECIES OF DALOPIUS ESCH. (ELATERIDAE, COLEOP.)*

BY W. J. BROWN.

Ottawa, Ontario.

The present paper is the result of an attempt to segregate the species confused in collections under the name *Dolopius lateralis* Esch. and to determine the characters of the genus *Dolopius* Esch. (*Dolopius* auct.). It is based on material in the Canadian National Collection supplemented by specimens from the collections of Messrs. Ralph Hopping, G. Stace Smith, J. B. Wallis, F. S. Carr, L. J. Milne, and E. H. Strickland. More than one thousand specimens of *Dolopius*, mostly from Canadian localities, have been available for study. I have recognized forty-two species in this material.

The specific and sexual characters in *Dolopius* are not striking. In the American species, the sexes agree in body form but, as in other Elateridae, differ in the form of genital segment. This segment may be observed at the apex of the abdominal dorsum when the apical segment of the abdomen and the elytra are separated. It is narrow and subcylindrical in the male, much larger and less convex in the female. The antennae are nearly always slightly longer in the male than in the female, but the difference is frequently too slight to be appreciated without difficulty. In one species, the sexes differ in color.

Specific characters are found in the aedeagus, prothorax, antennae, in the form of the elytral apex, and in size and color. More rarely, differences may be observed in the form of the body and in the sculpture of the pronotum. The most useful characters are those of the aedeagus; except in a few cases, the species may be identified by reference to these characters alone. The aedeagus is of the common, trilobed type. It consists of a basal piece to which are articulated one median and two lateral lobes. At the base of the median lobe are the median struts which project into the basal piece. The aedeagus shrivels somewhat when mounted dry. On this account, I have mounted the organs of all the males mentioned below in balsam on slides except those of twenty-five specimens of easily recognized species. The organs may be studied in liquid and show well their more general features when mounted dry on points beneath pinned specimens. The lobes of the aedeagus present excellent characters and show little variation except that due to the relative position of the parts. The median struts frequently offer useful characters, but due to their structure are subject to some distortion. The basal piece is subject to considerable distortion and is therefore of little value in defining closely allied species. It does offer valuable group characters.

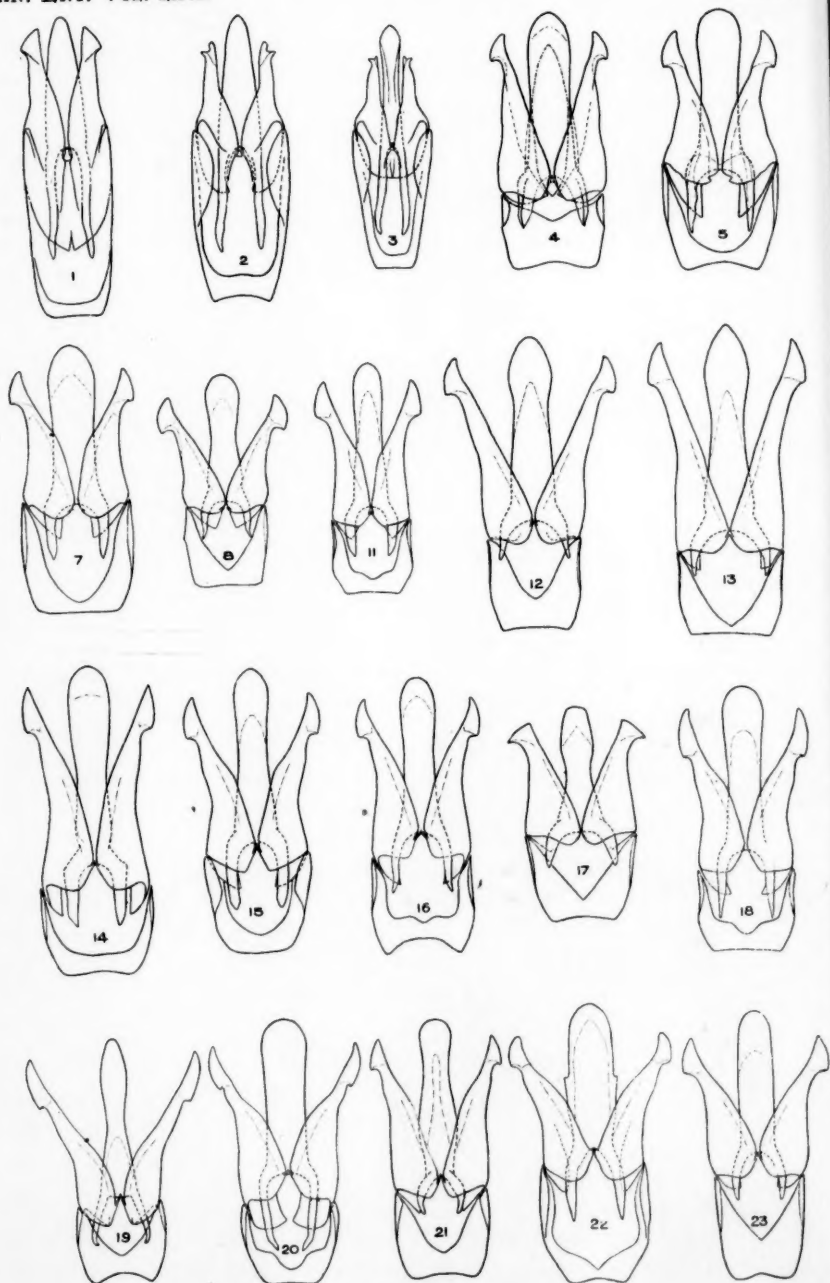
*Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

Most of the species possess color characters which distinguish them from species possessing genitalia of a similar type. The color characters therefore supplement those of the aedeagus and are of great value. The antennal characters are of less value but are occasionally very useful. I have attempted to determine the antennal length in each species by drawing an antenna along the lateral carina of the prothorax and noting the number of segments which extend beyond the apex of the posterior pronotal angle. This method has shown that specific and sexual differences occur but that there is considerable variation in antennal length in many of the species. In most of the species, the width of the pronotum is equal to the length measured on the median line. In species which are more elongate than usual, the pronotum is slightly longer than wide. In some species, the posterior pronotal angles are more strongly produced than in others, but the differences are slight. When the prothorax is viewed from beneath, it is seen that the posterior margin of the propleuron on each side is more or less emarginate. The depth of the emargination is rather constant in each species. In some species, the emargination is limited on the outer side by an angle. The angle is occasionally obsolete in examples of species that usually possess it. The elytra may be truncate, subtruncate, or rounded at apex. Like the angle of the propleuron, this character is subject to variation but is occasionally useful.

On account of the lack of strong structural characters except in the aedeagus, females must be identified by association with the males and by color and such other characters as they may possess. If one has a good knowledge of the species of the region in which he is working, such associations can be made satisfactorily in most cases. In the vicinity of Ottawa, I have taken six species; five of these are brown or blackish species of similar size. I am unable to separate females of two of these, but females of the others can be identified without much difficulty. In addition to the females mentioned in the descriptions below, I have about one hundred which are unidentified. Many of these are from California; they cannot be placed until the fauna of the state is well known. The others represent species which I can separate only by the characters of the aedeagus and are mostly from British Columbia.

It has been necessary to base the key to the species upon the characters of the aedeagus. I have divided the species into five groups by such characters. Two of these, the *insulanus* and the *cognatus* groups, and possibly also the *validus* group, are true natural groups. The *tristis* and *vernus* groups are artificial. The characters of the species are not well adapted to use in keys, but the key should serve as a useful guide to those working with the fauna of Canada, California, and the eastern half of the United States. It is probable that few species remain to be discovered in the Canadian fauna.

The characters of the genera *Dalopius* and *Agriotes* Esch. are not well understood. In Leng's catalogue of the Coleoptera of North America, the genera are placed in different tribes, an arrangement that I am unable to substantiate. Recently Dr. Van Dyke (1932, Proc. Cal. Ac. Sci. XX, 451) has suggested that the genera may have to be united. I have had available for study *Agriotes sputator* L. and *Dalopius marginatus* L., the type species of the genera, as well as a number of other European species of *Agriotes* and all of the North American species except *insanus* Cand., *brunneus* Schffr., *hispidus* Lec., *nevadensis* Lec.,



DALOPIUS SPECIES

montanus Lec., *bivittatus* Van Dyke, and *porosus* Van Dyke. Study of this material has revealed no single character of definitive value but has shown several characters of importance. *Dalopius*, as constituted in this paper, is undoubtedly a true natural group quite distinct from *Agriotes* and, I believe, worthy of generic rank. *Agriotes* lacks the remarkable homogeneity of *Dalopius* and may be composite. The genera may be compared as follows:

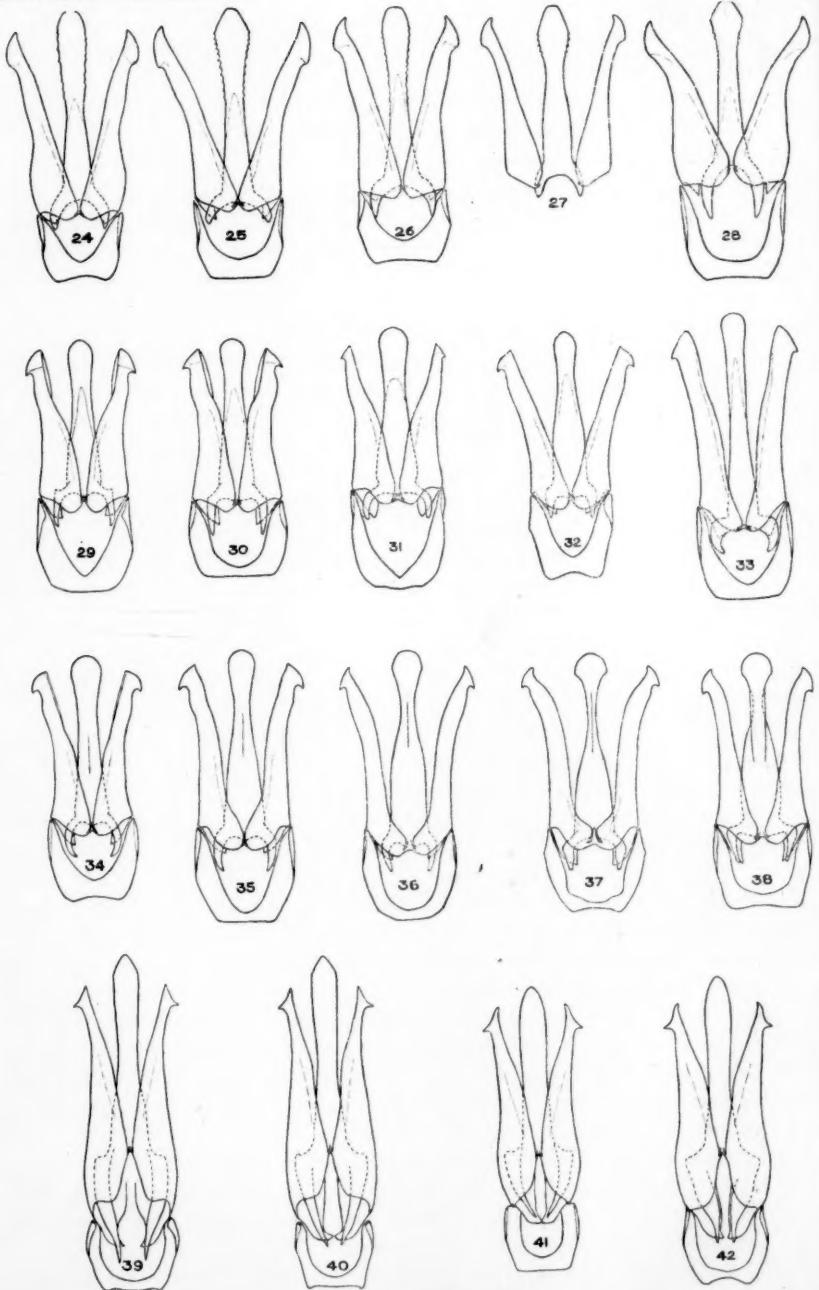
Dalopius—Body depressed, subcylindrical only in *inordinatus* n. sp. and *mirabilis* n. sp. Margin separating the side of the front and the antennal fossa strongly oblique and not directed toward the anterior margin of the front except in *marginatus* L. Lateral carina of the prothorax straight, always entire, not deflexed, its junction with the anterior margin external to the junction of the latter and the prosternal suture, the carina approaching the suture very closely only in *inordinatus*. Prosternal sutures slightly concave anteriorly but not excavated. Posterior coxal plates rather strongly but not suddenly widened internally, constant in form within the genus. Sculpture quite constant within the genus; the head and pronotum very closely, coarsely punctate; prothoracic venter rather finely punctate, the punctures close on the prosternum, dense on the propleura, the latter opaque; metasternum, abdomen, and legs very finely and closely punctate. Body clothed with fine, pale hairs, the vestiture constant within the genus.

Agriotes—Body subcylindrical. Margin separating the side of the front and the antennal fossa less strongly oblique and directed toward the anterior margin of the front except in *griddlei* Van Dyke. Lateral carina of the prothorax rarely straight, sometimes interrupted, deflexed, anteriorly joining the angle formed by the union of the apical prothoracic margin and the prosternal suture. Prosternal sutures strongly excavated except in *sparsus* Lec. Posterior coxal plates variable. Sculpture variable. Body more or less hairy.

In view of the characters of the genera, it is necessary to revise somewhat the content of each. *Agriotes thevenetii* Horn, properly placed by its author but included in *Dalopius* by recent cataloguers, must be referred back to *Agriotes*. *Agriotes inversus* Cand. and *Dolerosomus flavipennis* Mots., included in *Agriotes* in Leng's catalogue, are synonyms of *Sericus debilis* Lec. which is a valid species and not a synonym of *Sericus silaceus* Say as listed in the same catalog. Mr. G. S. Walley has examined the type of *Agriotes nevadensis* Lec. at my request and finds that it is a *Dalopius*. In *Agriotes blaisdelli* Van Dyke, represented in the collection by two paratypes kindly supplied by Dr. Blaisdell, the body is depressed and elongate, the prosternal sutures are not excavated, the antennal fossae are very small, the front is flat, and the lateral carinae of the prothorax join the anterior margin as in *Dalopius*. These characters forbid the retention of the species in *Agriotes*, and I suggest that it be placed with *Sericus silaceus* Say and *S. debilis* Lec., it being more closely related to these than to any other species known to me.

The genotype of *Dalopius*, *marginatus* L. of Europe, falls in the *vernus* group in the following key. In this species, the females are more robust than the males. Except in this sexual character and in the frontal character noted above, *marginatus* agrees well with the American species.

The following is a list of the previously described American species that are referred to *Dalopius* together with their synonyms. A note on the type locality



DALOPIUS SPECIES

of each is included. It will be noted that *lateralis* Esch. is preoccupied by *lateralis* Oliv., a synonym of *marginatus* L. In view of the fact that I have been unable to identify any of these species and that several of them will never be identified, I have described all of the species known to me as new.

Dalopius Esch.

Dalopius Eschscholtz, 1829, Thon, Entom. Archiv. II, Heft 1, 34. (*Dalopius* auct.)

Dalopius californicus Mann., 1843, Bull. Soc. Imp. Nat. Moscou XVI, 243. Described as a synonym of *lateralis* Esch.

Dalopius lateralis Esch., 1829, Thon, Entom. Archiv II, Heft 1, 34. Calif. (nec *lateralis* Oliv., 1790, Entomologie II, No. 31, 50, pl. VIII, fig. 80).

Sericosomus pauperatus Cand., 1863, Monogr. Elaterides IV, 434. Described as a synonym of *lateralis* Esch.

Dalopius sellatus Mann., 1852, Bull. Soc. Imp. Nat. Moscou XXV, 328. Sitka Island, Alaska.

Dalopius pauper Lec., 1853, Trans. Am. Philos. Soc. X, 458. Atlantic parts of North America. Probably based upon a concept including several species.

Dalopius subustus Lec., 1853, Trans. Am. Philos. Soc. X, 458. San Francisco, Calif.

Agriotes macer Lec., 1857, Rept. Expl. and Surv. Miss. to Pac. XII, 47. Shoalwater Bay, Ore. Probably belongs to the *insulanus* group of the following key.

Dalopius simplex Mots., 1859, Bull. Soc. Imp. Nat. Moscou XXXII, 378. California.

Dalopius sericatus Mots., 1859, Bull. Soc. Nat. Moscou XXXII, 379. Nova Helvetia and San Francisco, Calif.

Agriotes nevadensis Lec., 1884, Trans. Am. Ent. Soc. XII, 17. Western Nevada.

It is interesting to note that only four species of *Dalopius* are recognized in the fauna of the Old World. Of the forty-two species described in this paper, two are known only from eastern states. The limited amount of Californian material in the collection reveals eighteen species from the state. Ten species are known from British Columbia; two of these extend into Alberta. None are common to California and British Columbia. One species is known only from Alberta and one seems to be confined to Saskatchewan and Manitoba. Of the ten species known from eastern Canada, two extend into Alberta and two others into Manitoba.

In the case of each species, I have figured the aedeagus of the holotype. The numbering of the figures corresponds to the numbering of the species in the following key and descriptions.

KEY TO SPECIES.

1. Basal piece very large, slightly longer than the median lobe; lateral lobes membranous at base on the dorsal surface, the margins there difficult to trace; median struts parallel, subequal in length to the median lobe. Brown or blackish species; each elytron usually with a humeral spot, very rarely vittate, always truncate; propleuron deeply emarginate. Eastern species. (*cognatus* group) 5
- Basal piece much smaller, shorter than the median lobe; lateral lobes not membranous at base, the margins there very distinctly defined; median

- struts much shorter than the median lobe 2
2. Median struts foliaceous; basal piece very small; the lobes very long and slender. Propleuron feebly emarginate; elytron very distinctly truncate. Large, elongate species with long antennae. B. C., Calif. (*insulanus* group) 39
3. Median struts never foliaceous, usually slender; basal piece larger..... 3
3. Median lobe with the sides serrate, never carinate. Can., Calif. (*validus* group) 26
- Median lobe not serrate 4
4. Median lobe carinate or not, slender; apical portions of the lateral lobes never elongate, often wider than long. Alta., B. C., Calif. (*tristis* group) 30
- Median lobe never carinate, usually wider, never strongly constricted; apical portions of lateral lobes longer than wide except in *insolens*. (*vernus* group) 7
5. Apical portions of the lateral lobes not emarginate; the fourth segment of the antenna equal in length to the second and third united. W. Va.1. *virginicus* n. sp.
- Apical portions of the lateral lobes emarginate; the fourth segment of the antenna shorter than the second and third united..... 6
6. Median lobe wide and flat, not compressed laterally, not carinate. Ont. to N. S., W. Va.2. *cognatus* n. sp.
- Median lobe laterally compressed, its thickness and width subequal, with two carinae which separate the dorsal from the lateral faces. Man. to N. B., W. Va.3. *vagus* n. sp.
7. Emargination of basal piece shallow; median struts very stout; median lobe bearing on its ventral face a large, oval sclerite; body reddish-brown, the labrum usually reddish-yellow. Ont., Que.....4. *insolitus* n. sp.
- Emargination of basal piece deep; median struts less stout; median lobe without a sclerite on its ventral face; labrum not paler than the head..... 8
8. Sides of the median lobe dentate. Calif.....22. *dentatus* n. sp.
- Sides of the median lobe not dentate..... 5
9. Aedeagus very short, the width equal to two-thirds the length; apical portions of the lateral lobes much wider than long. B. C....17. *insolens* n. sp.
- Aedeagus elongate; apical portions of the lateral lobes longer than wide.. 10
10. Californian species 22
- Species of Canada and eastern sections of the United States..... 11
11. Body yellow or reddish-yellow; each elytron margined on the side and suture with brown or black..... 12
- Body darker, reddish-brown or black at least in part (body sometimes pale but the elytra without dark margins in *gartrelli*)..... 13
12. Elytra reddish-yellow; size usually larger, 5-6.8 mm. Alta., Man. to N. B.12. *pallidus* n. sp.
- Elytra yellow rather than reddish-yellow; size smaller, 4.3-5.1 mm. Sask., Man.11. *parvulus* n. sp.
13. Species of Alberta and British Columbia 19
- Species of Manitoba and eastern regions 14
14. Size larger, 7.3 to 9 mm..... 15
- Size smaller, 5 to 6.6 mm..... 16
15. Blackish; elytron rounded at apex; length 7.3 mm. Que...5. *fuscipes* n. sp.
- Reddish-brown; elytron truncate at apex; length 7.6-9 mm.; aedeagus as in *fuscipes*. Pa.6. *pennsylvanicus* n. sp.
16. Elytron rounded at apex, dark brown, usually with a pale vitta, the vitta occupying three intervals but not attaining the apex. Man. to Que.7. *vernus* n. sp.
- Elytron truncate at apex or with more extensive pale areas..... 17

17. Antenna short, not surpassing the pronotal angle by more than the length of one segment; sides of the pronotum not pale. 18
- Antenna surpassing the pronotal angle by the length of two segments in the male; the pronotal sides pale; pale vitta of the elytron attaining the apex; aedeagus as in *brevicornis*. Ont., Que. 10. *gentilis* n. sp.
18. Elytron with the humeral umbone pale, the pale area not extending beyond middle, the apex very distinctly truncate. Ont., Que. 8. *brevicornis* n. sp.
- Elytron with a large, entire pale vitta or entirely pale, feebly or not truncate; aedeagus as in *brevicornis*. Que., N. B. 9. *agnellus* n. sp.
19. Antennae reddish yellow; body reddish-yellow to reddish-brown; elytra never vittate and not paler than the pronotum. B. C. 13. *gartrelli* n. sp.
- Antennae dark; pronotum largely or entirely black; elytra rarely uniformly pale 20
20. Body shorter and more robust than usual; elytra reddish-brown, not vittate; size small, 4.3 to 4.6 mm. Alta. 23. *inordinatus* n. sp.
- Body of the usual form 21
21. Color black, the elytra not paler, the legs not or scarcely paler. B. C. 15. *corvinus* n. sp.
- Elytra paler than the pronotum; legs reddish. Alta., B. C. 18. *asellus* n. sp.
22. Entire body pale reddish. Calif. 14. *luteolus* n. sp.
- Body darker, the elytra frequently vittate, the pronotum darker than the pale areas of the elytra 23
23. Elytra dull red or reddish-brown; legs very dark reddish-brown; pronotum black with only the anterior margin and posterior angles paler. Calif. 16. *usitatus* n. sp.
- Elytra in part yellow; legs paler; the sides of the pronotum usually pale. 24
24. Size smaller, 5.3-6 mm.; median lobe unusually narrow. Calif. 19. *jucundus* n. sp.
- Size larger, 6.5-8 mm. 25
25. Central dark area of pronotum occupying more than half the disk; median struts short. Calif. 21. *tularensis* n. sp.
- Central dark area of the pronotum occupying less than half the disk; median struts long. Calif. 20. *gracilis* n. sp.
26. Elytra reddish-yellow 27
- Elytra blackish. Calif. 28
27. Body more convex and robust than usual. Alta., Man., Que. 24. *mirabilis* n. sp.
- Body of normal form. Calif. 25. *plutonicus* n. sp.
28. Pronotum slightly less densely punctate; lateral lobes less strongly widened basally. Calif. 26. *incomptus* n. sp.
- Pronotum more densely punctate; lateral lobes more strongly widened basally 29
29. Smaller, 6 mm.; lateral lobes with the apical portions obtusely angulate. Calif. 27. *lutulentus* n. sp.
- Larger, 7.5-8 mm.; apical portions of the lateral lobes not angulate. Calif. 28. *validus* n. sp.
30. Median lobe carinate 35
- Median lobe not carinate 31
31. Lateral and median lobes subparallel, the median lobe very slender. B. C. 33. *suspectus* n. sp.
- The lobes less parallel, the median lobe wider. 32
32. Apical portions of the lateral lobes very small; body largely pale, each elytron with a dark sutural vitta. Calif. 31. *partitus* n. sp.
- Apical portions of the lateral lobes of normal size; color darker, elytra not vittate 33
33. Apical portion of the median lobe narrower; inner margins of the lateral

- lobes straight. Calif. 32. *effetus* n. sp.
 Apical portion of the median lobe wider; inner margins of the lateral lobes not straight 34
34. Apical portions of the lateral lobes short. Calif. 30. *vetulus* n. sp.
 Apical portions of the lateral lobes much longer. B. C. 29. *spretus* n. sp.
35. Median lobe bicarinate on both its dorsal and ventral surfaces at the constriction; entire body reddish-brown. Calif. 38. *improvidus* n. sp.
 Median lobe with a single median carina on the dorsal surface. 36
36. Median lobe strongly constricted; elytron pale reddish-brown, not vittate. Calif. 37. *ignobilis* n. sp.
 Median lobe less strongly constricted; elytron darker or vittate. 37
37. Apices of the lateral lobes very acute; elytron with a yellow vitta. Calif. 36. *manipularis* n. sp.
 Apices of the lateral lobes less acute. B. C., Alta. 38
38. Median lobe relatively wider at apex, constricted near the middle; male elytra usually paler; size usually smaller. B. C., Alta. 34. *fucatus* n. sp.
 Median lobe narrower at the apex, the constriction subapical; male elytra usually darker; size usually larger. B. C. 35. *tristis* n. sp.
39. Lobes of the aedeagus more elongate; the oblique apical margins of the lateral lobes almost straight; median lobe with the apex pointed. 40
 Lobes of the aedeagus less elongate; the oblique apical margins of the lateral lobes sinuous; median lobe with the apex rounded. 41
40. Blackish, each elytron rarely with a pale humeral spot. B. C. 39. *insulanus* n. sp.
 Dorsum largely reddish-yellow. Calif. 40. *invidiosus* n. sp.
41. Vitta of elytron rather indistinct or absent, never extending beyond the middle. B. C. 41. *maritimus* n. sp.
 Vitta of elytron usually very conspicuous and extending almost to apex. Calif. 42. *mutabilis* n. sp.

1. *Dalopius virginicus* n. sp.

Male. Length 7.6 mm. Dark brown; basal segments of antennae, apical margin and posterior angles of prothorax, a spot on humeral unibone of each elytron equal in size to the scutellum, and margins of apical abdominal segment reddish-yellow; the legs very pale reddish-yellow.

Antenna surpassing the pronotal angle by the length of three segments; the fourth segment equal in length to segments two and three together. Pronotum as wide as long, the posterior angles moderately produced. Propleuron deeply emarginate and strongly angulate. Elytron very distinctly truncate.

Length of aedeagus 1.32 mm.; lateral lobe not emarginate near its apex, its basal portion large and extending more deeply into the basal piece than in *cognatus*; median lobe as in *cognatus*, broad, flat, not carinate.

Holotype—♂, Fairmont, W. Va., 1928, (P. N. Musgrave); No. 3543 in the Canadian National Collection, Ottawa.

Paratype—1 ♂, same data.

The paratype measures 7.3 mm., and due to the position of the parts, appears to have the apical portion of the lateral lobe of the aedeagus slightly more elongate than in the type. The species differs from *vagus* and *cognatus* only in size and in the characters of the antenna and aedeagus.

2. *Dalopius cognatus* n. sp.

Male. Length 7.3 mm. Humeral spot of elytron slightly larger than the scutellum; legs pale reddish brown. Antenna surpassing the pronotal angle by the length of three segments; fourth antennal segment three-fourths as long as

the second and third together. Length of aedeagus 1.22 mm.; each lateral lobe emarginate near the apex, the portion distad to the emargination membranous; median lobe broad and flat, neither compressed laterally nor carinate. Other characters as in *vagus*.

Female. Antenna surpassing the pronotal angle by the length of one segment.

Holotype—♂, Go Home Bay, Ont., June 27, 1932, (G. S. Walley); No. 3544 in the Canadian National Collection, Ottawa.

Allotype—♀, same data.

Paratypes—♂, same data; 5♂, 6♀, same data, June 18 to July 11; 1♂, 1♀, Parry Sound, Ont., July 14, 1932, (G. S. Walley); 2♂, Gravenhurst, Ont., July 1, 1932, (G. M. Stirrett); 2♂, 2♀, Turkey Point, Ont., June 8, 1931, (W. J. Brown); 1♂, Fisher Glen, Ont., June 11, 1931, (W. J. Brown); 1♂, 2♀, Forestville, Ont., June 15, 1931, (W. J. Brown); 7♂, 1♀, Delhi, Ont., June 15, 1931, (W. J. Brown); 2♂, Toronto, Ont., June 1-15, 1927 and June 17, 1932, (L. J. Milne); 2♂, Kentville, N. S., June 19 and 27, 1923 and 1924, (R. P. Gorham); 1♂, Westchester Lake, N. S., July 29, 1927, (C. A. Frost); 1♂, 1♀, Laniel, Que., Aug. 13 and 30, 1932, (W. J. Brown); 2♂, 1♀, Wakefield, Que., June 15, 1932, (W. J. Brown); 8♂, 3♀, June 5 to July 17, 1927 to 1930, (J. A. Adams, G. S. Walley, L. J. Milne, W. J. Brown); 2♂, 1♀, Pottton Springs, Que., July 7, 1928 (G. H. Fisk); 1♂, Fairmont, W. Va., 1929, (Musgrave); 1♂, Antrim, N. H., June 12, 1932, (C. A. Frost).

The paratypes measure from 6.4 to 7.5 mm. In many of the specimens, the humeral spot is larger than in the type. In some it extends over the basal third or fourth to form a short vitta. In several, it extends to or almost to the apex as an obscure vitta. In two specimens, each elytron is reddish, darker near the sutural and lateral margins except at apex. In some specimens, the angle of the propleuron is obsolete, but the emargination is always deep. The elytron is rarely only feebly truncate. The antenna varies slightly, surpassing the pronotal angle by one or one and one-half segments in the female and from two to three segments in the male. The aedeagus measures from 1.15 to 1.41 mm. In three specimens, the subapical angle of the lateral lobe is not quite as strongly produced as in the type. In several the basal piece appears narrower, forcing together the basal portions of the lateral lobe. This seems to be due to the position of the parts.

The present species differs from *vagus* in having the average size greater, the legs often a little darker in color, and the humeral spot more often extended, but differs constantly only in the form of the aedeagus. It resembles also *fuscipes* and *virginicus* in color.

(To be Continued.)

A CHECK LIST REVISION OF THE GENUS BASILARCHIA SCUD. (LEPID.: RHOPALOCERA)

BY J. D. GUNDER,
Pasadena, California.

An excellent way to present generic revision is to show the names arranged in annotated check list style. This method stresses classificational position. I believe entomologists in general are becoming more concept-minded and realize

the need of improved lower categorical systems and better Code Rules governing the arrangement of their names. In lepidoptera this need is felt strongest. (See note under No. (15) in this article and also the *Entomological News* for July, Nov. and Dec., 1932, for further discussion.)

The following columns show the older *Basilarchia* listing on the left (for comparison) and the newer listing on the right. A few of the older names have undoubtedly been misconcepted. I think that a majority of lepidopterists dislike having to bracket authorship and consider it a nuisance. Little seems to be gained entomologically by the use of these zoological symbols. Subdivisions *a*, *b*, *c*, etc. denote races; see "Introduction" to the 1926 list.

Old Listing

(Barnes & Benj., 1926)

Basilarchia Scud.

- Type *Callianira ephestiaena* Hbn.
 ‡*Callianira* Hbn.
 Type *Callianira ephestiaena* Hbn.
 308 *arthemis* (Dru.)
 lamina (Fabr.)
 ab. rufescens (Ckll.)
 ab. arthechippus Scud.
 a rubrofasciata B. & McD.
 b proserpina (Edw.)
 c astyanax (Fabr.)
 ephestion (Stoll.)
 ursula (Fabr.)
 ephestiaena (Hbn.)
 ab. cerulea (Ehr.)
 ab. rubidus (Stkr.)
 form viridis (Stkr.)
 form atlantis Nakahara.
 form inornata Nakahara.
 form albofasciata (Newc.)
 ab. benjamini Nakahara
 d arizonensis (Edw.)
 309 *weidemeyrii* (Edw.)
 a nevadae B. & Benj.
 b sinefascia (Edw.)
 form norm.
 angustifascia B. & McD.
 310 *lorquini* (Bdv.)
 ab. eavesii (Hy. Edw.)
 ab. comstocki Gun.
 a burrisonii (Mayn.)
 311 *archippus* (Cram.)
 disippe (Godt.)
 ab. pseudodorippus (Stkr.)
 ab. lanthanis Cook & Wats.
 ab. advena (Ellsw.)
 cayuga Nakahara.
 a floridensis (Stkr.)
 eros (Edw.)
 ab. halli Wats. & Comst
 form nig (Stkr.)
 nigricans (Stkr.)
 312 *obsoleta* (Edw.)
 hulstii (Edw.)

New Listing

(bracketed numbers indicate explanation given below.)

Basilarchia Scud.

- Type *Callianira ephestiaena* Hbn.
 ‡*Callianira* Hbn.
 Type *Callianira ephestiaena* Hbn.
 308 *arthemis* Dru. (1)
 lamina Fabr.
 rufescens Ckll. (2)
 form albofasciata Newc. (3)
 hyb. proserpina Edw. (4)
 cerulea Ehr. (5)
 benjamini Nakahara (6)
 a rubrofasciata B. & McD. (7)
 309 *astyanax* Fabr.
 ephestion Stoll
 ursula Fabr.
 ephestiaena Hbn.
 form viridis Stkr. (8)
 form purpuratus Gun. (9)
 form atlantis Nakahara (10)
 form inornata Nakahara (11)
 a arizonensis Edw.
 tr. f. doudoroffi Gun. (12)
 310 *weidemeyrii* Edw. (13)
 tr. f. nigerrima Ckll. (14)
 a angustifascia B. & McD. (15)
 tr. f. sinefascia Edw.
 b nevadae B. & Benj.
 hyb. fridayi Gun. (16)
 311 *lorquini* Bdv.
 form eavesii Hy. Edw. (17)
 tr. f. comstocki Gun.
 a burrisonii Mayn. (18)
 312 *archippus* Cram. (19)
 disippe Godt.
 form advena Ellsw.
 cayuga Nakahara
 tr. f. pseudodorippus Stkr.
 lanthanis Cook & Watson
 tr. f. nivosus Gun.
 hyb. rubidus Stkr. (20)
 hyb. arthechippus Scud. (21)
 hyb. rubrofascchippus Gun. (22)
 a floridensis Stkr.
 eros Edw.
 form nig Stkr. (23)
 nigricans Stkr.
 tr. f. halli Cook & Wats. (24)
 b obsoleta Edw. (25)
 hulstii Edw.

(1) *ARTHEMIS* Dru., *rubrofasciata* and *astyanax* are closely related geographical groups; *rubrofasciata* being (western) boreal, *astyanax* being austral and *arthemis* (generally speaking) found in between. *Arthemis* is the "prime" group according to (unnatural) Code priority which makes it the species and *rubrofasciata*, which is superficially nearest, becomes its race. Any one of these three groups could easily be the natural species, if we only knew which was oldest off the root stem. This, we do not know, so have to fall back to the "prime" or first given name. (See 2nd paragraph, p. 172, July, 1932, *Entom. News.*) My series of *arthemis* from Lincoln, Neb., Hayward, Wisc., the Catskill Mts., N.Y., and Rangeley, Maine, show no appreciable differences. I place *astyanax* in the species column simply to facilitate the shortening of nomials found with it and, except for the sake of conveniences, have no objection to its former racial standing; however, and this is important, *astyanax* really is quite different looking from the other two, which moreover approximate each other, and all three are genitically similar; also *arizonensis* fits better superficially as a race of *astyanax*, than it does as a race under *arthemis*.

(2) *RUFESCENS* Ckll. In almost any series of *arthemis*, throughout its range, are found examples in which the red color beneath may or may not extend gradually over the secondaries and even fully flush the primaries. Occasionally this red color beneath, when extra heavy, infiltrates a reddish sheen over the black designed areas above. This condition is not uncommon in *astyanax* on both surfaces. In *arizonensis* the red, or rather orange in this case, often spreads over the lower sides. An examination of the colored illustration of Drury's type shows that he *happened* to describe an *arthemis* of this nature, as its under sides, especially the secondaries, are almost a solid red; furthermore, his text reads: "The parts that on the upper side are black, are here of a fine red brown." Therefore, *rufescens* falls as a synonym and our conception of *arthemis* will have to include the above described condition as a typical trait probably prototypic of *rubrofasciata*. Cockerell did not establish a type for his name, but followed some remarks by Maynard.

(3) *ALBOFASCIATA* Newc. I have a pair of Newcomb's major types which includes the important "No. 1" or what we might now call the "holotype". This ♂ type is marked—"No. 1, TYPE", with Newcomb's signature; in addition to a data label reading—"Fort Lee, Hudson Co., N. Y. VII-9-1908, Otto Schwanke Coll." The ♀ type is labeled—"No. 4, TYPE, with Newcomb's signature, in addition to two labels reading—"Woodside, L. I., 28-VII-03" and "Collected by O. Fulda." In his original description, he says "variety" *albofasciata* occurs from Mass. to N. J. As a matter of fact I am unable to tell his types from the average occurring *arthemis*; however, as the "No. 1" ♂ and the "No. 4" ♀, together with the colored illustrations in *Psyche*, pl. 11, ff. 7-8, 1907, show specimens without the rows of red spotting on the upper sides of their secondaries, I think *albofasciata* can stand as a good form similar to *inornata* and for the same reason. Both of the Newcomb types which I possess show very slight red spotting in the apical area on the upper sides which is not unusual. As Dr. McDunnough has written, I do not think that Newcomb was very well acquainted with typical *arthemis*. The locality data of his types, including the Ohio reference, do not indicate localization at all and his "sports" or width-of-white-band-notation which

his "No. 1" does not show (that being typical), keeps the name out of synonymy with *proserpina*. His placing of his white-banded *albofasciata* as a "variety" of non-banded *astyanax*, instead of a "variety" of white-banded *arthemis* was an error of course.

(4) PROSERPINA Edw., (hyb. *arthemis* et *astyanax*). There is no disputing the fact that *proserpina* only occurs where *arthemis* and *astyanax* overlap, are meeting, or have met. My series show examples all the way from Nebraska east to Massachusetts and include the really wonderful collections made over a period of fifteen years by Max Rothke in the vicinity of Scranton, Penn. Lincoln, Neb. (or western *proserpina*) specimens are no different from those found in the east or at Stony Clove in the Catskill Mts. of New York where Edwards secured his first two similar males upon which he based his original description in 1865. *Proserpina* is not geographical in a racial sense, as for example, *rubrofasciata*, because *proserpina* develops only where the parental stocks happen to exist, be this north or south, east or west, in a warm valley or on a mountain ridge. *Arthemis* is white banded on both surfaces, while *astyanax* is without these bands and as both are physically and superficially first cousins, hybridization laws produce all intergrades between the two. Placed in graduated series, *proserpina* first shows up as a mere trace or start of the white design on the under side of the primaries nearest the outer margin; next it develops in a corresponding manner on the upper surface; as the bands become more pronounced on the primaries, they appear on the secondaries, narrow at first and with a fused appearance, until there is a considerable steady width; finally these bands become as wide and definitely solid white as in *arthemis*, making distinction between *arthemis* and *proserpina* difficult. As in *arthemis* or in *astyanax*, the red rows of spotting on the upper side of the secondaries may appear on *proserpina*, either fully developed, partially evident or not at all. Also in *proserpina*, its ground color shading may be either the typical blue (which is common), the greenish shade of *viridis* which seems less common or the metallic purple (see No. (9)) which is rare. This last named makes a beautiful combination in conjunction with *proserpina* and I have one example. There always seem to be more *proserpina* showing less development of the banding than those with more fully developed bands. The genetic reason vouched for this is that it takes longer to lose the dominant strain. (See Field's article, page 88, June, 1910, *Psyche*). In hyb. *fridayi* Gun. (*nevadac* et *lorquini*) the lesser developed examples are also more plentiful. This comparative commonness of slightly marked *proserpina* has led to a misconception in some quarters as to what the name really stands for. Future conception, however, will have to be based upon all gradations as cited above and not upon any one so-called step in gradation. This means that names given to 'steps' in the gradation will have to fall as synonyms and there are two already given. Edwards himself, later in life, recognized the intergrading aspect of *proserpina*, though his name was based on a primary stage of its sequence. His early collectors noted this condition as per their letters cited in his 2nd volume. I recently received a letter (Sept. 18, 1933) from Mr. Frank Watson of the American Museum in which he says, "In Stony Clove, near Hunter in the Catskills, *proserpina* is relatively common. Some years ago I spent two vacations there and collected a fine series. It is exceedingly variable, there being every intergrade. From memory, it seems to me that one

out of every ten or twelve could be referred to *proserpina*. It is not a race. Early July is the best (collecting) time." There is no doubt that the status of *proserpina* is correctly determined as a hybrid. Inasmuch as *proserpina* Edw. has white banding in part, I am placing its name under *arthemis* instead of under *astyanax*. See Mr. W. L. W. Field's articles in *Psyche* as follows: "Problems in the Genus *Basilarchia*," XI, 1-6, 1904; "The Offspring of a Captured Female of *Proserpina*," XVII, 87-89, 1910 and "Hybrid Butterflies of the Genus *Basilarchia*," XXI, 115-117, 1914. These papers are well illustrated and he definitely confirms the hybrid character of *proserpina* on p. 117 in his Aug., 1914, article.

(5) *CERULEA* Ehr.. I doubt Ehrman would have described *cerulea* if he had known the gradations of *proserpina* under which it falls as a synonym. With the type in Pittsburg (Carnegie Museum) is another example marked "paratype" which is not mentioned in the original description. I have upper and under side photographs of each. Both are ♀'s with all the white bands *just starting* to take form in their usual positions.

(6) *BENJAMINI* Nakahara, was named from one female of the Barnes Coll. and is labeled—"Mass., July, 1919." In looking at its upper and under side photographs, I find that they are practically the same as those of *cerulea*, but the white banding is just a little stronger or more developed, though not quite a positive and clearly defined band. *Benjamini* is just another phase in the developing intergrade of *proserpina* under which it falls as a synonym.

(7) *RUBROFACIATA* B. & McD. is illustrated in the Barnes Contributions. My series comes from Alberta and others from Manitoba. All have the solid red submarginal belt beneath, instead of the centered rows of red spots in this area.

(8) *VIRIDIS* Stkr. are examples of *astyanax* showing a greenish tone instead of the more usual bluish tone. Not only may the greenish shade be noticed upon the upper surfaces, but on the submarginal designs beneath as well. Both color tones fade into each other. Pure green specimens are more or less rare. This greenish cast is not uncommon throughout the named range of *astyanax* and *arthemis*. I believe green examples are more plentiful in the southern states than in the northern states.

(9) ***Basilarchia astyanax* Fabr., form *purpuratus* n. f.**

Typically described and common *astyanax* are of the usual blue color, even up to what might be termed a *bright blue*. Form *viridis* Stkr. represents those specimens which are of a greenish cast and there generally is a sequence of shading between the two colors. Yet another color tone exists, independent of *viridis* which I term *purpuratus*, as above, because of its definite violet cast, in some specimens approaching a brilliant metallic purple. This color tone also shades into the blue of typical *astyanax* as does the green of *viridis* as stated above. Form *purpuratus* is the rarest of the *astyanax* color hues and I do not believe any more namable color phases exist. I hesitate to add more color names but think it advisable to complete the record of those in existence for what future value their names may afford. The types are average *astyanax* in size; both have short apical row of red spots on the upper side of the primaries and both fail to show any extension of red flushing below, so that their purple tone is independent of this condition. In the ♂ type, the upper side of the primaries have much purple

tone though the shade is cast over all upper side surfaces. In the ♀ type, the purple tone is very noticeable and strong on the upper side of the secondaries at the anal angle, in addition to the same color on the outer marginal designs of the under sides. I have one *proserpina* in which *purpuratus* provides a lively color tone, making it look like a *morpho* in color. The color of *purpuratus* undoubtedly extends through all the *astyanax* (except *viridis*) and *arthemis* divisions.

Holotype—♂, expanse 66 mm.; July 4th, 1914, Scranton, Penna.

Allotype—♀, expanse 77 mm.; July, 1926, Scranton, Penna. Collected by Max Rothke. Types in Author's Coll.

(10) *ATLANTIS* Nakahara is a name given to examples having a submarginal row of red spots across the upper surface of the hind wing. Usual *astyanax* only has the partial row on the upper side of the fore wing. I have specimens showing complete rows on both wings at the same time.

(11) *INORNATA* Nakahara represents specimens entirely without the submarginal red spotting on the upper surface. Mississippi Valley States provide more of this form than do the Atlantic States. Variation similar to *inornata* or *atlantis* is not uncommon throughout the Genus; for example, form *cavesii* Hy. Edw. of species *lorquini* Bdv. in which the red spotting appears. In forms like either *inornata* or *atlantis*, whether their tendency be progressive or retrogressive, the indicated end-state is often surmised as existant, whereas in transition forms, this objective is either more often obscure or in process of formation.

(12) ***Basilarchia astyanax arizonensis* Edw., tr. f. *doudoroffi* new tr. f.**

The upper surface is fused over with jet black which covers the usual green designs of the secondaries; on the primaries the two white apical spots remain as well as a trace of the submarginal border white dots. On the under side the marginal designs, including the submarginal yellow crescents on the secondaries, remain about typical though slightly obscured, while the discal and basal areas become melanic to the almost total exclusion of green color. *Classification*: change of pattern; melanifusism, spread of dark design, this type almost a final phase, but not as far advanced as is the type of *weidemeyerii nigerrima* Ckll.

Holotype—♂, expanse 70 mm.; Tonto Creek near Payson, Gila County, Arizona, July 12, 1933. Collected by Mr. M. Doudoroff of Palo Alto, Calif., after whom it is named. Type in Author's Coll.

(13) *WEIDEMEYERII* Edw. does not always have the complete submarginal row of red spots on the upper wings as Edwards' illustrations would lead one to believe. The white bands are wide in most Colorado examples.

(14) *NIGERRIMA* Ckll. (Bull. So. Calif. Acad. Sci., XXVI, 5, Jan.-Apr., 1927). This is an almost black Colorado tr. f. of *weidemeyerii*, similar to *doudoroffi* which is described in this paper.

(15) *ANGUSTIFASCIA* B. & McD. is an Arizona race of species *weidemeyerii* Edw. Its white bands are not quite as wide and there are other slight differences which representative series in both sexes confirm. In 1882 Mr. Edwards thought that *weidemeyerii* extended from Colorado down south into the Arizona region; so, when he found an Arizona "ab.", he named it *sinefascia*, meaning without bands, in other words, *sinefascia* is a similar, black tr. f. like *nigerrima*, *doudoroffi* and other western types. In 1912 Barnes and McDun-

nough discovered that the average run of typical Arizona specimens differed from the Colorado species and so gave to them the rank and title of race *angustifascia*. By adhering to present priority rule (see B. & Benj. List), *sinefascia* becomes the racial name IN RACIAL CHECKLIST POSITION leaving *angustifascia* next "heir in line to the throne" under the awkward and synonymous title of "form norm." It means that a valid race has as its representative type, the name of a valid tr. f. which thereby loses its connected identity! But why smother the identity of any valid and lower classificational concept? Of course the answer is that modern entomological taxonomists are working under antiquated zoological dictation. The average old-time zoologist working with the larger mammals does not have the entomological situations which would cause him to feel that certain of his rules are antiquated. The Code functioned well in entomology for handling the major group names of yesterday, but it needs a little remodeling to cope with the minor titles of today. Regarding a possible solution of the "form norm." problem, my opinion, broadly speaking, is that insect nomenclature divides itself into two great parts; one part being the *major* groups or unit entities which are known as species and races, and the other part being the *minor* portions which are the various forms or lower concepts, always "found with" and positionally dependent upon the major first part. If we had Code Rules which made priority necessary WITHIN BOTH parts, but NOT BETWEEN either, I believe such situations as arise with "form norm." names could be dispensed with. However, and this is important, *priority* within the higher concepts (meaning the forms, tr. fs., and hybrids) is just as necessary as is *priority* within the higher concepts (meaning the species and their races). In my list arrangement of the names *angustifascia* and *sinefascia*, I expect adverse comment; but why continue to sing the old song "God Save the Code" when its newer version "Give us Zoological Improvement or give us Entomological Independence" might do more good. One way to improve laws is to break them.

(16) FRIDAYI Gun. (hyb. race *nevadae* et *lorquini*). There is graded variation within hyb. *fridayi* as there is within hyb. *proserpina*; i.e., in *fridayi*, the size of the apical brown area on the upper side of the primaries varies from none at all to as much as is found in *lorquini* and specimens with the lesser amount of apical brown are the commonest. Incidentally, the extent of the brown patch indicates a corresponding amount of pattern hybridization elsewhere.

(17) EAVESII Hy. Edw. is a form produced by *lorquini*, like others in the genera, which has a row of reddish-brown spots outside the central band on the upper side of the wings. This row is more noticeable on the secondaries and it may vary from a well defined series to just an indication of their presence. Form *cavesii* of *lorquini* is less common than is form *atlantis* of *astyanax*.

(18) BURRISONII Mayn. is a very dark brown northern race of *lorquini* into which it grades. It has a less extensive brown apical area on the primaries. My darkest series of specimens come from the Olympic Mts. of Washington.

(19) ARCHIPPUS Cram. To save repetition of text and to understand my arrangement of the names found under this species, down as far as *nivosus* Gun., it will be necessary to see p. 325 of the December, 1929, *Bull. of the Brooklyn Entom. Society*, and to consult the accompanying illustrations. Incidentally, Dr. Holland shows a colored figure of tr. f. *pseudodorippus* Stkr. on pl. LIX, fig.

30 in his 'Revised' edition. This figure is not quite a final phase for *pseudodorippus*, but it nearly approaches my fig. c which is the final phase. Note the totally dark border of my figure. When *archippus* happens to mate with other of the related groups in the genus, their progeny more strongly resemble *archippus*. For this reason I have placed the three known hybrids under this species, to-wit:

archippus with *astyanax* equals *rubidus* Stkr.

archippus with *arthemis* equals *arthechippus* Scud.

archippus with *rubrofasciata* equals *rubrofasechippus* Gun. (See No. 22.)

Their color and patterned relationship is most interesting and makes a conclusive key as to their identity. The other known hybrids in genus *Basilarchia* are:

astyanax with *arthemis* equals *proserpina* Edw.

nevadae with *lorquini* equals *fridayi* Gun.

There is every reason to believe that further hybridizing between different groups will be noted in the future.

(20) RUBIDUS Stkr. (hyb. *archippus* et *astyanax*.) The original type (a ♂) is in excellent condition and labeled: "*Limenitis Rubidus Streck. Hybrid ex Misippus et Ephestion. Berks Co., Penn. Orig. Type.*" Strecker did not bother to write out a description himself, but cited T. L. Mead's remarks in the Can. Ent., IV, p. 217, (1872). Several years ago while in the Field Museum at Chicago, I took photographs of the type and recently (Dec. 9, 1933) Mr. Gerhard kindly sent me a complete description, as follows: "*(Upper side).* The ground color of the fore wings is a dark reddish or mahogany brown, much like a dark *B. a. floridensis*. Toward the margin of the wings are four light brown spots, this row of spots terminating on the costa with a somewhat elongated white spot. The wings are margined with a rather broad black area, in which is a submarginal row of bluish spots. The outer margins are alternately black and white. The ground color of the hind wings is a shade lighter than that of the primaries; the six light brown spots terminating the basal color fill the space between the veins; and the submarginal row of spots have a more bluish tinge. Outer margins marked like the fore wings. There is no sign of blue on the upper side other than that in the row of submarginal spots on both wings. The above mentioned spots terminating the basal color do not have an orange tinge. (Note: the color of these spots is simply a lighter and brighter shade of the ground color, in some examples of *rubidus* approaching a dark orange tone—Gunder). (*Under side.*) The under sides of the forewings have marking similar to the upper but the ground color is lighter; the discal cell has an apical transverse yellowish bar and a larger round spot of the same color in the middle. The front margin of the cell has two bluish white spots and beyond on the costa is a light bluish streak. The row of apical spots are larger than those above and brighter in color, shading from a yellowish at the base to an orange color at the tip. Between the bluish white submarginal spots and the edge is another row of small, elongated bluish spots. The under side of the hind wings is again a lighter reddish brown, with three still lighter spots near the base (like on *astyanax*) and three small bluish spots nearer the base. Near the anal angle, the inner side of the black transverse line is thinly margined with blue. The area between the transverse black line and the double row of lunate submarginal bluish spots is lighter brown than that of the base. Marginal area of wings black." I have two ♂ *rubidus* from

the Hal Newcombe Coll.; one is labeled—"Wesley, Mass." and the other—"Sharborn, Aug. 1896. Coll. by A. L. Babcock, Esq." The latter specimen has been beautifully illustrated in color by Newcomb in *Psyche*, vol. XIV, pl. 11, fig. 14 and it should serve as ready identification for *rubidus*, as both specimens approach Strecker's type. I believe there are also two specimens in the Barnes Coll. at Washington; labeled—"Brooklyn, N. Y., Sept. 9, 1913" and "Jeanette, Westmoreland Co., Pa."; the latter is lighter in color than the former. In some *rubidus* the reddish ground color is more darkly overcast than in others causing some specimens to show-off the submarginal row of light colored spots on the upper side of the secondaries.

(21) *ARTHECHIPPUS* Scud. (hyb. *archippus* et *arthemis*) is represented by a number of ♂ examples in the Museum of Comparative Zoology at Cambridge, Mass., and a number of others have been reported as taken in the New England states. I have one example received in exchange from the Museum which is No. 5, a ♂, from the Field experimental series. Edwards recognized the existence of such a hybrid in 1882; Scudder described it as such in 1889 and Mr. W. L. W. Field illustrated two examples on pl. 11, in *Psyche* for Feb. 1904; also in *Psyche* of Aug., 1914, on p. 115, he tells in detail of his breeding experiments in producing *arthechippus*, two of the resultant hybrid examples being shown. There is no doubt therefore that *arthechippus* is a hybrid. It differs from *rubidus* on the upper side by having three white dash-shaped spots at the end of the cell on the primaries, as well as a long white dash along the costa at this point and on the secondaries by having an incomplete row of small white spots just interior of the row of orange-brown spots, though separated from them by a thick black line. On the under side, these additional white maculations are repeated, but the row on the secondaries are thicker and lunate shaped as well as being a bluish-white color. *Arthechippus* and *rubidus* both have the same mahogany brown ground color and both vary as to the depth of this shade. I suspect that the amount of white design, extra on *arthechippus*, varies in individuals according to the amount found on the *arthemis*-half of its parentage.

(22) ***Basilarchia archippus* Cram., hyb. *rubrofasechippus* new hybrid.**

The hybrid between *archippus* Cram. and *rubrofasciata* B. & McD., being similar to hyb. *arthechippus* (*arthemis* et *archippus*). Both are alike in their combined characteristics, yet different as their parentage differs. *Arthechippus* Scud. is illustrated on pl. 2, figs. 2 and 3, in Feb., 1904, *Psyche* and also by the two lower figures on pl. 7 in the August, 1914, *Psyche*. *Upper side*, same mahogany brown as *arthechippus* and *rubidus*. Short row of submarginal light brown spots in apical area nearer costa as in these two. The white spots at end of cell, four in number, start at costa and end near terminus of the yellow spots; they taper in size like the same white spots found in *archippus*, but are larger than in average *archippus*. The secondaries are very similar to *arthechippus*, having the submarginal row of lighter brown spotting, but in *rubrofasechippus* these spots are well defined, lighter and have a fattened crescent shape; the row of white spots internal to these is also well defined, larger and whiter than in *arthechippus*. *Under side*. The difference between species *arthemis* and its race *rubrofasciata* is to be found mostly on the under sides, thus in hyb. *rubrofasechippus* is the difference noticed between it and *arthechippus*. In *arthechippus*

there are usually 4 yellow submarginal spots in the apical area, whereas in *rubrofasechippus* these spots altogether form a solid yellow area. On the secondaries the submarginal yellow spots again form an almost solid band of yellow instead of a defined yellow row of spots; also the row of white spots internal to this becomes a slightly broken white band instead of a regular series of spotting. The general color tone of the under side is lighter than that found on the under side of *arthechippus*.

Holotype—♂, expanse 54 mm., (smaller than the type of *arthechippus*); Beulah, Manitoba, Canada. June 29, 1904. Collected by A. J. Dennis. Type in Author's coll.

(23) *NIG* Stkr. (= *nigricans* Stkr.) are simply specimens of race *floridensis* Stkr. which have a darker ground color. There is no change in maculation. I had the opportunity of photographing the type in Chicago. It has the usual black line across the secondaries on the upper side and on the under side there are the frequently found white spots internal of this line. It is singular how great is the resemblance between race *floridensis* and the hybrids *arthechippus* and *rubrofasechippus*.

(24) *HALLI* C. & W. is a parallel tr. f. to *pseudodorippus* Stkr., both showing either a partial or complete absence of the black line across the upper side of the secondaries. In *floridensis* I know of no case where this line disappears either wholly or in part from the under sides, but in *archippus* this line often is completely absent from BOTH surfaces.

(25) *OBSOLETA* Edw., *floridensis* Stkr. and *archippus* Cram. are related groups. *Archippus* is widespread over United States, while *floridensis* and *obsoleta* are more local.

In my study of the Genus *Basilarchia*, I wish to acknowledge considerable help from D. W. Farquhar of the Biological Institute of Cambridge and from Marston Bates of the Museum of Comparative Zoology, as well as from Wm. J. Gerhard of the Field Museum at Chicago, Ill.

ro-
ies
ad
his
ng.
ler

);
in

sis
I
ack
are
reat
and

ow-
side
ars
ten

ted
and

able
rom
. J.